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Effects of cortical stimulation on self-monitoring performance in people who stutter

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Abstract

Introduction: People who stutter (PWS) have been shown to be slower and less accurate than controls on a phoneme monitoring task designed to tap into the phonological encoding stage of speech production (Garnett & Den Ouden, 2013; Sasisekaran et al., 2006). The left posterior superior temporal gyrus (pSTG) is involved in phonological processing tasks (Den Ouden et al., 2013; Indefrey, 2011). The purpose of this study is to investigate the effects of cortical stimulation using High Definition Transcranial Direct Current Stimulation (HD-tDCS) on the performance of PWS during phoneme monitoring.

Methods: 20 PWS and 20 controls will participate in this study. Presently, 4 PWS and 5 controls have completed the study. Participants received 20 minutes of HD-tDCS targeting the left pSTG in three different conditions (left posterior field orientation [LPFO], right anterior field orientation [RAFO], and sham) over three separate days. Following stimulation, participants monitored for the presence of a target phoneme during silent picture naming. Reaction times (RT) as well as accuracy (ACC) were measured.

Results: Data collection is ongoing. Preliminary data suggest that LPFO decreases RT in PWS, approaching the sham (baseline) RT of controls, while RAFO increases RT in controls to nearly that of sham (baseline) for PWS (Figure 1). There is a trend for stimulation to increase ACC in PWS, and decrease ACC in controls, irrespective of field orientation (Figure 2).

Discussion: Findings should be considered tentative at this time, but if the present trends hold, this study yields two important contributions to the field of stuttering. First, results suggest that the left pSTG is involved in phonological processing and/or speech monitoring, as focal stimulation of this cortical area affects performance in all subjects. Second, results would support further investigation into clinical application of HD-tDCS to target phonological encoding as a process that may affect stuttering.

Keywords: Speech monitoring; Phonological encoding; HD Transcranial direct current stimulation; Stuttering

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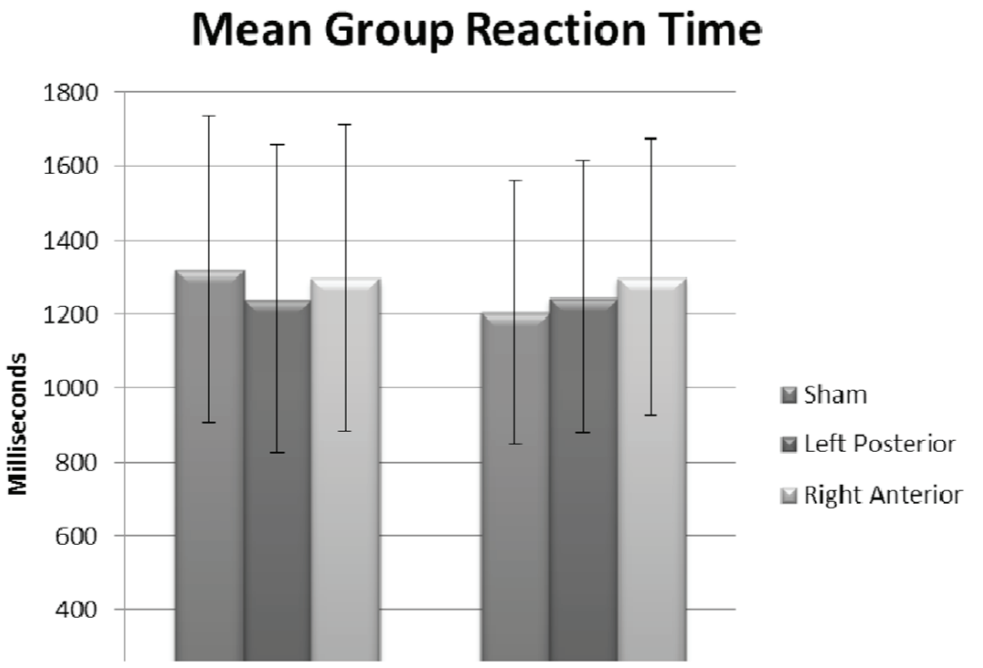

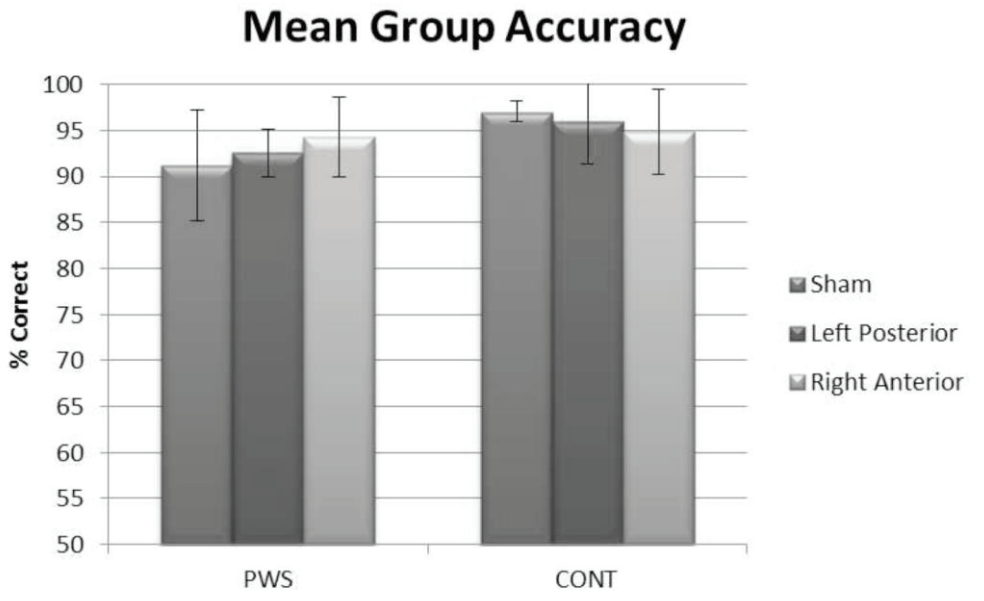

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